Teresa S. Barich
MDS Nordion

MDS Nordion is building two specialized MAPLE reactors (10 mega watts) and a processing facility dedicated to medical isotope production at Atomic Energy of Canada's (AECL) Chalk River Laboratories site.

The planned facility will produce molybdenum 99, which decays into technetium 99m - the isotope most widely used in hospitals and clinics to diagnose many illnesses. More than 50,000 procedures are carried out around the world each day to diagnose cancer, heart disease, as well as to detect other problems in the brain, heart, lungs, liver, thyroid, kidneys and bone. Nuclear Medicine can continue to rely on MDS Nordion produced radioisotopes.

The facilities will also produce xenon-133, iodine-131 and iodine-125. MAPLE 1 will be the main isotope producer. MAPLE 2 will provide alternate production during maintenance shut downs of the primary reactor. Each reactor is housed in a separate building. The MDS Nordion MAPLE reactors will provide a secure supply of critical medical isotopes well into the next century.

Heavy Water Production Through Catalytic Exchange

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Earlier this year AECL had committed to build a prototype CIRCE (Combined Industrial Reforming and Catalytic Exchange) plant for the production of heavy water (lMg per year). This new process, which extracts deuterium from a steam-reformed hydrogen source will be constructed in the Province of Ontario in conjunction with a new steam methane reformer being built by an industrial partner. This plant would incorporate the BHW (Bithermal heavy water) process and the CECE (Combined Electrolysis and Catalytic Exchange) process in its second and third stages, respectively. Commissioning of a pilot-scale unit to demonstrate the use of the CECE process for upgrading and detritiation of heavy water is currently in progress at the Chalk River Laboratories.

The heart of the above liquid phase catalytic exchange (LPCE) processes is the "wetproofed catalyst" developed at AECL for the exchange of hydrogen isotopes between hydrogen gas and liquid water. Highly active structured catalytic modules that incorporate hydrophobic catalytic layers and hydrophilic mass-transfer layers have been developed. The isotope-exchange reaction takes place on the hydrophobic catalytic layers while the isotope transfer between water vapour and liquid water occurs on the hydrophilic layers. Optimization of the performance of these two processes has been a challenging task due to the fact that they require opposing surface properties.

In-Target Chemistry: A Review of the Production of Precursors for PET Radiopharmaceuticals